

## INULOPSIS SYNOPSIS (ASTERACEAE: ASTEREAEE)

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### ABSTRACT

The South American genus *Inulopsis* O. Hoffm. is treated here as comprising four species: *I. scaposa* (DC.) O. Hoffm. (the type), *I. stenophylla* Dusen, I. (*Aster*) ***camporum*** (Gardner) Nesom, *comb. nov.*, and ***I. phoenix*** Nesom, *sp. nov.* The genus, which occurs in Brazil, south-eastern Bolivia, eastern Paraguay, Uruguay, and northern Argentina, is hypothesized to be most closely related to the *Podocoma* group of South America, including *Podocoma*, *Asteropsis*, *Sommerfeltia*, *Microgynella*, *Laennecia*, and *Blakiella*. A key, descriptions, and distribution maps are provided for the species of *Inulopsis*.

KEY WORDS: *Inulopsis*, *Aster*, *Podocoma*, Asteraceae, Astereae

*Inulopsis* was described by Hoffmann in 1890, based on the single species *I. (Haplopappus) scaposa* (DC.) O. Hoffm. This species was suggested by Bentham (1873) to lie within *Hysterionica* Willd.; Baker (1882) included it within the genus *Leucopsis* (DC.) Baker, which is now largely absorbed by *Noticastrum* DC. (Zardini 1965). A second species of *Inulopsis* was added by Dusen (1910). Without any other comment, Grau (1977) noted that *Inulopsis* should be treated as a synonym of *Podocoma*, but no taxonomic proposals have ever been made to formalize such a view. Grau's suggestion apparently was followed by Zhang & Bremer (1993), who did not include *Inulopsis* in their recent taxonomic summary and phylogenetic analysis of the Astereae. In the present treatment, however, *Inulopsis* is considered to be a distinct genus of east-central South America comprising four species. One of these is previously undescribed and one is transferred to *Inulopsis* from the genus *Aster* L.

*Inulopsis* (DC.) O. Hoffm. in Engler & Prantl, *Naturl. Pflanzenfam.* 4(5):149. 1890. *Haplopappus* sect. *Inulopsis* DC., *Prodr.* 5:349. 1836. Lectotype species (Hoffmann 1890): *Inulopsis scaposa* (DC.) O. Hoffm.

Herbaceous perennials from a ligneous rhizome and fibrous system of thickened roots; leaves and stems glabrate to densely hirsute-villous with Type A trichomes (designation of trichome types follows Nesom 1976), also with resinous, sessile glands in *Inulopsis camporum*, with Type C trichomes, Type B trichomes minute and inconspicuous but often abundant. Leaves all basal or basal and cauline on the lowermost portions of the stem, obovate to linear, toothed to nearly entire, with 1-2 pairs of parallel veins beginning at or near the base. Heads solitary on scapose stems, hemispheric to turbinate; phyllaries lanceolate to lanceolate-oblong, more or less evenly herbaceous, flat (not keeled or concave), 1-nerved (rarely with a lateral pair), in 3-4 subequal series, the outer  $1/2-3/4$  as long as the inner; receptacles flat, epaleate, sometimes barely alveolate. Disc flowers numerous, functionally staminate, with narrowly funnelform, orange-veined corollas 3-6 mm long, the limb ca.  $1/2-5/8$  the length of the corolla, without an abrupt widening from the tube to the limb, the 5 lobes deltate and essentially erect, hairy or glabrate; anthers with ovate-lanceolate, eglandular, white apical appendages; style branches connate, without stigmatic lines or clearly demarcated collecting appendages, spreading hairy. Ray flowers uniseriate, ligules white to creamy, sometimes drying yellowish, extending well past the involucre, often coiling at maturity, the tube densely pilose with long, duplex (Type C) trichomes. Achenes eglandular, densely strigose-sericeous to sparsely strigose with white trichomes (Zwillingshaare), 2-4 mm long, oblanceolate to elliptic-oblanceolate, strongly flattened with 2 thick, whitish, lateral ribs, sometimes with an extra rib on each face, apically rounded and the pappus inserted on a barely formed neck; carpopodium 0.1-0.2 mm wide, a ring of white, sclerified cells, 4-6 cells high; pappus of (1-)2-3 series of apically attenuate bristles of equal length, sometimes with a short outer series of setae. Base chromosome number,  $x=9$ .

DeCandolle (1836) included two species in his *Haplopappus* sect. *Inulopsis*: *H. stoloniferus* DC. and *H. scaposus* DC. He clearly associated *H. stoloniferus* most closely with sect. *Inulopsis*, as it does have a superficial resemblance to *Inula* L. and has been treated within that genus. Hoffmann (1890), however, retained *H. stoloniferus* within *Haplopappus* and segregated *H. scaposus* as the monotypic genus *Inulopsis*, elevated from sectional rank. Greene (1895) observed the disparity of *H. stoloniferus* with *Haplopappus* and made it the type and sole species of his new genus *Osbertia* E. Greene, a member of the primarily North American "goldenaster group" (Nesom 1991) and only distantly related to *Inulopsis*.

#### KEY TO THE SPECIES OF *INULOPSIS*

1. Heads produced before appearance of basal leaves; leaves and stems glabrate or densely hirsute-villous; phyllaries thin-herbaceous and green-

ish, with greenish-yellow, non-resinous nerves; disc corollas 5-6 mm long; achenes densely sericeous. .... (3)

1. Heads produced after or concurrently with appearance of basal leaves; leaves and stems glabrate to very sparsely hirsute-villous; phyllaries thickened and orangish, the veins accompanied by dark orange resin canals; disc corollas 3-5 mm long; achenes sparsely strigose. .... (2)
  2. Leaves obovate, 3-7 cm long, 10-24 mm wide. .... *I. scaposa*
  2. Leaves linear, 4-10 cm long, 1.5-2.0 mm wide. .... *I. stenophylla*
3. Stems, leaves, and phyllaries prominently hirsute-villous; outer phyllaries 1.0-1.8 mm wide; disc corolla lobes hairy. .... *I. camporum*
3. Stems, leaves, and phyllaries glabrous or glabrate; outer phyllaries 1.5-2.5 mm wide; disc corolla lobes glabrate. .... *I. phoenix*

1. *Inulopsis scaposa* (DC.) O. Hoffm. in Engler & Prantl, *Naturl. Pflanzenfam.* 4(5):149. 1890. *Haplopappus scaposa* DC., *Prodr.* 5:350. 1836. *Hysterionica scaposa* (DC.) Benth. ex Baker [in syn.] in Mart., *Fl. Bras.* 6(3):6. 1882; not in Benth. & Hook., *Gen. Pl.* 2:253. 1873. *Leucopsis scaposa* (DC.) Baker in Mart., *Fl. Bras.* 6(3):6. 1882. LECTOTYPE (here designated): DeCandolle cited two collections, both from Brazil: "prov. Minarum Generalium ad Serro-Frio, [1833], (Vauthier! pl. exs. n. 315)"; "prov. Sancti-Pauli (h. Mus. imp. Bras. n. 436!)." The Vauthier specimen also was among those cited by Baker (1882); it is in the G-DC herbarium (fiche!) and is here designated as the lectotype.

*Aster longipes* Gardner in Hook., *London J. Bot.* 7:98. 1848. TYPE: BRAZIL. Minas Gerais: "dry campos near the foot of the Serra de Piedade," Sep 1840, *G. Gardner* (BM).

*Erigeron nudiscapus* Sch.-Bip., *Linnaea* 22:571. 1849. *Nomen nudum*, based on a *Regnell* collection ("l. 252") but without description.

Leaves basal, oblanceolate to obovate, weakly 3-nerved, 3-7 cm long, 10-24 mm wide, thick, the surfaces glabrous to loosely and sparsely to moderately pilose, eglandular, margins mucronulate to widely serrate, sparsely to moderately ciliate near the base; scapes 10-27 cm long, glabrous, with a number of scattered, minute, linear bracts; heads 8-13 mm wide (pressed); phyllaries narrowly lanceolate to linear-lanceolate, in 3-4 series graduated in length, the longest 5-7 mm long, flat, with a single, dark orange vein; ray flowers 25-40; disc corollas 3-5 mm long, the lobes glandular; achenes obovate, sometimes

with an additional rib on one or both faces, 2.0-2.5 mm long, sparsely strigose; pappus of (1-)2 series of even-length bristles, with a few short setae in an outer series; chromosome number,  $n=9$  (Coleman 1968). Map 1.

2. *Inulopsis stenophylla* Dusen, Arkiv. Bot. 9(15):22, pl. 7. 1910. TYPE: BRAZIL. Parana: in rocky country between Capao Grande und Villa Velha, 5 Mar 1904, *P. Dusen 3989* (Isotypes: M photo-MO!, MO!).

Similar to *Inulopsis scaposa* but different in the following features: leaves basal, linear, apparently 1-nerved, 4-10 cm long, 1.5-2.0 mm wide, subcoriaceous, glabrous or the margins sparsely ciliate near the base, eglandular, margins entire to widely denticulate; scapes 15-22 cm long; ray flowers 16-28; achenes broadly oblanceolate. Map 1.

I have studied one additional specimen besides the type: BRAZIL. Parana: Fortaleza, in campo rupestris, 26 Feb 1910, *Dusen 9556* (GH).

3. *Inulopsis phoenix* Nesom, *sp. nov.* TYPE: BRAZIL. Distrito Federal: area of Cristo Redentor, recently burned cerrado (4 Sep 1990), 18 Sep 1990, *M.L.M. Azevedo & D. Alvarenga 939* (HOLOTYPE: US!).

*Inulopsi camporo* (Gardner) Nesom similis sed caulibus foliis phyllariisque glabratis trichomatibus glandularibus ac eglandularibus carentibus (praeter caules superos minute pubescentes), phyllariis exterioribus 1.5-2.5 mm latis, et lobis corollarum disci glabratis differt.

Leaves produced after flowering, basally disposed, clusters of basal leaves apparently produced on rhizome tips later in the season (as in *Archer 4093* and *Hatschbach 37239*); stems 9-25 cm tall, with numerous, thin ribs, sometimes branched at the very base early in the season, short lateral branches arising later; stems, leaves, and phyllaries glabrate. Cauline leaves (at flowering) few, the larger somewhat clustered toward the base, subclasping, oblanceolate, 5-50 mm long, up to 25 mm wide, entire or with 2-6 pairs of shallow teeth or mucros on the distal margins, the lowermost scale-like and not enlarging, the upper bracteate, linear-lanceolate. Heads turbinate-hemispheric, 14 mm wide (pressed); inner phyllaries ca. 8 mm long, lanceolate to narrowly oblong-lanceolate, apically acute, midvein narrow, slightly or not at all orange, not raised, occasionally also with a pair of lateral veins. Ray flowers ca. 20, the corollas 10 mm long, the tube 3-4 mm long, densely hairy with long, biseriate trichomes, the ligules 1-2 mm wide and 3-5 veined. Disc corollas 5-6 mm long, the lobes glabrate; style branches linear, 1.5-2.0 mm long. Fertile achenes elliptic-obovate, 4 mm long, 1.2 mm wide, sometimes with an additional rib



Map 1 (below). Distribution of *Inulopsis camporum* and *I. phoenix*.  
 Map 2 (above). Distribution of *Inulopsis scaposa* and *I. stenophylla*.

on one or both faces, densely sericeous; pappus of 2-3 series of numerous bristles 6-8 mm long; sterile achenes sericeous, linear, elongating to 5-6 mm but not producing an embryo. Known only from the type collection. Map 2.

These plants are similar to *Inulopsis camporum* and occur within its geographic range. While the strongly reduced vestiture of *I. phoenix* may reflect only a small genetic divergence from *I. camporum*, the difference in appearance is striking. Further, the upper stems of *I. phoenix* produce a large number of minute, appressed, uniseriate hairs (Type B trichomes), in contrast to *I. camporum*, but the achenes are densely sericeous like those of *I. camporum*. The epithet refers to the character of the plants in arising from ashes to live another period.

4. *Inulopsis camporum* (Gardner) Nesom, *comb. nov.* BASIONYM: *Aster camporum* Gardner in Hook., London J. Bot. 7:79. 1848. *Erigeron camporum* (Gardner) Sch.-Bip. *ex Benth.* (*in syn.*) in Benth. & Hook., *Gen. Pl.* 2:273. 1873. TYPE: BRAZIL. Estado Goias: "open campos near Nossa Senhora d'Abadia," Serra Geral, May 1840, G. Gardner 4237 (BM).

Similar to *Inulopsis phoenix* but with the following features: stems, leaves, and phyllaries moderately to densely hirsute-villous with vitreous-whitish, flattened, uniseriate, multicellular trichomes mostly 0.5-1.3 mm long, also with much smaller (Type B) trichomes, leaves and phyllaries with sessile glands producing translucent, orange-resinous heads; heads (9-)12-18 mm wide (pressed); outer phyllaries 1.0-1.8 mm wide; ray flowers 18-35, the corollas 9-12 mm long; disc corolla lobes prominently invested with biseriate glandular hairs and uniseriate glandular hairs; fertile achenes obovate to elliptic-obovate, 4.0-5.5 mm long, 1.2-1.5 mm wide. Map 2.

After the original description of *Aster camporum*, the species was maintained in *Aster* by Bentham (1873), whose identification was adopted by Baker (1882). In his infrageneric classification of *Aster*, however, Bentham placed *A. camporum* in a position equivalent to other groups at sectional rank, but he did not provide the species with a formally designated name in that category, only noting that its placement within *Aster* was uncertain and that it perhaps should be referred to some other genus. The notation by Schultz-Bipontinus (apparently "*in sched.*") that *A. camporum* should be considered a species of *Erigeron* L. was formally recorded by Bentham, who listed it in synonymy (see above) with Schultz's nomenclatural combination in *Erigeron*. Bentham observed that *A. camporum* resembles the South American *A. vahlii* Hook. & Arn., here considered to be a member of the *Oxytripolium* group of New World *Aster* (in contrast to a previous evaluation of mine, Nesom 1992; detailed comments to follow, Nesom in prep.). Since these 19th century treatments, the

systematic position of *A. camporum* apparently has not been formally evaluated.

Neither "*Aster*" *camporum* nor any of the other species of *Inulopsis* can be accepted in any group currently treated as either *Aster* or *Erigeron*. *Erigeron* has short-tubed disc corollas, fertile disc ovaries, oblong achenes, and 1-seriate pappus bristles; most New World species currently treated as *Aster* have a capitulescence of numerous heads, fertile disc ovaries and subterete, multinerved achenes, and a uniseriate pappus. The Andean genus *Oritrophium* (Kunth) Cuatr., where *Aster vahlii* has sometimes been placed, resembles *Inulopsis* in its scapose and monocephalous stems, basal rosette of leaves, functionally staminate disc flowers, and tendency for flat, 2-nerved achenes, but the similarity is convergent as *Oritrophium* is a member of the Hinterhuberinae and is only distantly related to the *Podocoma* group (Nesom in prep.).

#### DEFINITION OF *INULOPSIS*

*Inulopsis* is essentially characterized by the following morphological combination: plants rhizomatous with a fibrous system of thickened roots; leaves weakly 3-nerved, mostly basal, produced after or concurrently with flowering; stems scapose or subscapose, monocephalous; disc flowers functionally staminate, the style branches without stigmatic lines and connate to the apex; ray flowers in a single series, with conspicuous, creamy-white ligules extending well past the involucre; fertile achenes oblong-obovate, flat, with a pair of thickened, whitish, lateral nerves, apically rounded to a narrow pappus insertion, and the faces eglandular but variably invested with Zwillingshaare; and pappus of 2-3 series of apically attenuate bristles of equal length, sometimes with a short outer series. The sessile glands and eglandular tomentum of *I. camporum*, which are absent on the other species, are helpful in assessing the nature of the infratribal relationship of *Inulopsis*. The species of *Inulopsis* are divided into two groups, as noted above in the key, but the coherence of most characters of these species provides evidence of monophyly.

Distinctive habitual features of *Inulopsis* (rhizomatous, with thick storage roots, and rapid production of flowering heads) apparently are directly correlated with the habitat of these plants. They have most commonly been collected in recently burned savannas with a marked wet/dry cycle. The collection data on the type specimen of *I. phoenix* indicates that the flowering stems and mature heads were produced within 14 days after a burn in the area.

RELATIONSHIPS OF *INULOPSIS*

*Inulopsis* apparently is most closely related to taxa of the primarily South American "Podocoma group" (Nesom in prep.): *Podocoma* Cass., *Asteropsis* Less., *Sommerfeltia* Less., *Microgynella* Grau, *Laennecia* Cass., and *Blakiella* Cuatr. (Nesom 1990a, 1990b, 1994a, 1994b; Nesom & Laferrière 1990; Nesom & Zanowiak 1994). The first three of these genera are similar to *Inulopsis* in geographic distribution, while *Laennecia* and *Blakiella* are primarily Andean. Within the Astereae, Australian genera among those referred to by Zhang & Bremer (1993) as the "Vittadinia [A. Rich.] group" are similar in significant respects to the *Podocoma* group (Nesom in press). For the most part, the genera in both of these continental groups appear to be well-differentiated, although the nature of the inter-relationships among them is difficult to assess. *Inulopsis*, also, is morphologically isolated among these genera.

The *Podocoma* group is characterized (with exceptions) by the following features in which *Inulopsis* is similar: resinous glandularity at least on the leaves (*Podocoma* is eglandular); 1-nerved phyllaries; functionally staminate disc flowers with sterile ovaries (disc ovaries fertile in *Laennecia*, *Microgynella*, and *Podocoma*); fertile achenes flat, obovate to broadly oblanceolate, the faces glandular (eglandular in *Asteropsis* and *Podocoma*), rounded at the apex to a relatively narrow pappus insertion, with at least a tendency to form a neck or beak (erostrate in *Laennecia*, *Microgynella*, and *Sommerfeltia*); and pappus of 2-3 series of equal-length bristles, sometimes with a short, outer series. In large part, however, the other genera of the *Podocoma* group differ from *Inulopsis* in their numerous ray flowers in multiple series, often with short ligules (compared to relatively few ray flowers in a single series, with prominent ligules), although the ligules of *Asteropsis* are long and conspicuous. Except for *Laennecia* and *Inulopsis*, the disc corollas of the *Podocoma* group are funnellform with a linear tube longer than the spreading limb; the tube is distinctly shorter in *Laennecia* but about equal or slightly shorter than the limb in *Inulopsis*. The basis for Grau's association of *Inulopsis* with *Podocoma* was unstated, but *Podocoma* (Nesom & Zanowiak 1994) is divergent from *Inulopsis* particularly in its leafy, branching stems, often with several heads, clasping cauline leaves, fertile disc ovaries, and rostrate achenes.

*Inulopsis* bears some resemblance to another group of austro-brasilien genera, the "Leptostelma group," comprising *Leptostelma* D. Don, *Apopyros* Nesom, *Neja* D. Don, and *Hysterionica* Willd. (Nesom 1994c, 1994d, in press). These occur in similar habitats and are similar in their eglandular, erostrate achenes, but in other aspects of achenial and phyllary morphology, the *Leptostelma* group appears to be most closely related to *Erigeron* and *Conyza* (Nesom in prep.).



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